

Having thus, described the invention, what is claimed is:

1 1. A multi-cylinder internal combustion engine, comprising an engine block
2 having a plurality of oil galleries formed therein, an oil filter and an oil cooler operatively
3 attached to the engine block, and a balancer rotatably disposed within said engine block;
4 wherein said oil filter is attached to a side surface of said engine block;
5 wherein said oil cooler and said balancer are each respectively attached to a front
6 central portion of said multi-cylinder internal combustion engine;
7 said engine further comprising an oil pan and an oil pump for drawing oil from an oil
8 reservoir portion of the oil pan and for supplying the oil to individual portions of the internal
9 combustion engine after passing the oil through the oil filter and the oil cooler;
10 wherein said engine is configured so that oil from said oil cooler is introduced to a
11 substantially central part of a main oil gallery formed in said engine block.

1 2. A multi-cylinder internal combustion engine as set forth in claim 1, further
2 comprising a crankshaft having a plurality of crankshaft webs, wherein said balancer
3 comprises a driven gear and wherein an intermediate crankshaft web of said crankshaft is

4 provided with a drive gear thereon; and wherein said drive gear on said crankshaft is meshed
5 with the driven gear of said balancer so as to thereby drive said balancer.

1 3. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil filter can be detached from said engine without interference from components of said
3 engine.

1 4. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil cooler improves oil flow throughout said engine so that oil pressure is uniform.

1 5. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil filter comprises an oil filter case and an oil filter element.

1 6. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil cooler and said balancer are so situated throughout said engine so as to maintain a
3 weight balance from left to right.

1 7. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil cooler is utilized with a water-cooled version of said engine, and wherein an
3 additional cooling effect is achieved by running airflow over said oil cooler when said
4 engine is moving through space.

1 8. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said engine comprises
3 a crankshaft comprising webs, and
4 bearings surrounding said crankshaft webs,
5 and wherein said oil cooler supplies oil, which is of uniform pressure and has a
6 cooling effect, to said bearings of said engine.

1 9. A multi-cylinder internal combustion engine as set forth in claim 8, wherein
2 said balancer is powered by driving mechanism which is narrower than one of said
3 crankshaft webs.

1 10. A multi-cylinder internal combustion engine as set forth in claim 1, wherein

2 said oil filter case is easily removable for ease of maintenance.

1 11. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said balancer is located near the gear drive assembly unit.

1 12. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil cooler is disposed at the front of said engine, so that said oil cooler is receptive of
3 moving airflow.

1 13. A multi-cylinder internal combustion engine as set forth in claim 1, wherein
2 said oil cooler is disposed centrally along said engine, so as to distribute oil evenly to said
3 engine internal components.

1 14. A multi-cylinder internal combustion engine adapted to be transversely mounted
2 in a vehicle frame, said engine comprising
3 an engine block having a front surface and having a plurality of oil galleries formed

4 therein;

5 a crankshaft disposed in the engine block and having a longitudinal axis which is

6 substantially parallel to the front surface of the engine block;

7 an oil cooler attached to the front surface of the engine block; and

8 a balancer rotatably disposed in the engine block and comprising a balance weight;

9 wherein the oil cooler and the balancer are respectively disposed proximate a

10 substantially central portion of the front surface of the engine block.

1 15. The internal combustion engine of claim 14, further comprising an oil filter

2 situated proximate the oil cooler and oriented substantially orthogonal thereto.

1 16. The internal combustion engine of claim 14, wherein the crankshaft has an

2 integral balancer drive gear thereon, and the balancer comprises a driven gear which is

3 enmeshed with said balancer drive gear.

1 17. The internal combustion engine of claim 14, wherein said engine comprises a
2 balancer support shaft which is supported and non-rotatably fixed onto an interior wall of the
3 engine block, and wherein said balancer is rotatably mounted on said balancer support shaft.

1 18. The internal combustion engine of claim 14, wherein the oil cooler is mounted
2 on the front side of an intermediate cylinder, and wherein the balancer is positioned on the
3 front side of another intermediate cylinder.

1 19. The internal combustion engine of claim 14, wherein said engine is configured so
2 that oil from said oil cooler is introduced to a substantially central part of a main oil gallery
3 formed in said engine block.

- 1 20. A motorcycle, comprising:
- 2 a frame, and
- 3 an internal combustion engine mounted transversely in said frame, wherein the
- 4 internal combustion engine is the engine of claim 14.